

condition of the atmosphere depends not merely on the temperature of the air, but also on its dryness, on the velocity of the wind, and on the suddenness of atmospheric changes, all combined with the physiological condition of the observer. A complete expression for the relation between atmospheric conditions and nervous sensations has not yet been obtained.

PRECIPITATION.

[In inches and hundredths.]

The distribution of precipitation for the current month, as determined by reports from about 2,500 stations, is exhibited on Chart III. The numerical details are given in Tables I, II, and III. The total precipitation for the current month was heaviest (from 9 to 12 inches) in a narrow belt on the western slope of the Appalachians, stretching from central Tennessee to southwest Virginia. Equally heavy rain fell over a small area of the western slope of the Sierra Nevada, in central California. The largest values at regular stations were: Halifax, 8.8; Portland, Me., 8.0; Neahbay, 7.2; Yarmouth, 7.0; Eureka and Sydney, 6.9.

The current departures from the normal precipitation are given in Table I, which shows that there was a slight excess in New England and in several smaller regions, but, in general, there was a slight deficiency. Large excesses were: Portland, Me., 4.6; Rochester, 3.4; Northfield, 3.1. Large deficits were: Cape Henry and Augusta, 3.8; Neahbay, 3.3; Charlotte and Chattanooga, 3.2; Vicksburg, 3.1; Columbia, 3.0.

The average departure for each district is also given in Table I. By dividing these by the respective normals the following corresponding percentages are obtained (precipitation is in excess when the percentages of the normals exceed 100):

Above the normal: New England, 128; middle Atlantic, 105; lower Lake, 140; North Dakota, 178; northern Slope, 204; middle Plateau, 130; southern Pacific, 127.

Normal: Florida Peninsula and northern Plateau.

Below the normal: south Atlantic, 54; east Gulf, 85; west Gulf, 73; Ohio Valley and Tennessee, 98; upper Lake, 67; upper Mississippi, 73; Missouri Valley, 73; middle Slope, 63; southern Slope (Abilene), 9; southern Plateau, 63; north Pacific, 72; middle Pacific, 93.

The years of greatest and least precipitation for March are given in the REVIEW for March, 1890. The precipitation for the current month was the greatest on record at: Portland, Me., 8.02; Northfield, 6.41; Cheyenne, 2.06; Huron, and Helena, 1.71; Williston, 1.80. It was the least on record at: Cape Henry, 1.38; Hannibal, 0.92; El Paso, T.

The total accumulated monthly departures from normal precipitation from January 1 to the end of the current month are given in the second column of the following table; the third column gives the ratio of the current accumulated precipitation to its normal value.

Districts.	Accumulated departures.	Accumulated precipitation.	Districts.	Accumulated departures.	Accumulated precipitation.
	Inches.	Perc't.		Inches.	Perc't.
Middle Atlantic.....	+ 0.40	104	New England.....	- 0.80	93
Florida Peninsula.....	+ 0.40	105	South Atlantic.....	- 1.70	87
Lower Lakes.....	+ 0.80	110	East Gulf.....	- 2.30	86
North Dakota.....	+ 1.10	153	West Gulf.....	- 0.80	93
Northern Slope.....	+ 0.40	121	Ohio Valley and Tenn.....	- 2.30	79
Middle Plateau.....	+ 0.30	107	Upper Lakes.....	- 2.30	72
North Pacific.....	+ 3.20	114	Upper Mississippi.....	- 1.30	64
			Missouri Valley.....	- 1.70	63
			Middle Slope.....	- 1.70	50
			Abilene (southern Slope).....	- 1.30	64
			Southern Plateau.....	- 0.40	75
			Northern Plateau.....	- 1.40	76
			Middle Pacific.....	- 1.00	93
			South Pacific.....	- 1.50	77

Details as to excessive precipitation are given in Tables XII and XIII.

The total monthly snowfall at each station is given in Table II. Its geographical distribution is shown on Chart VI. The southern limit of freezing temperatures and possible snow is shown on this chart by the isotherm of minimum 32°.

The depth of snow on the ground at the close of the month is shown on Chart VII.

HAIL.

The following are the dates on which hail fell in the respective States:

Alabama, 6, 11, 12, 31. Arizona, 5. Arkansas, 5, 6, 31. California, 1 to 4, 14, 26, 27, 28. Colorado, 22, 25, 27, 28. District of Columbia, 19. Florida, 10. Georgia, 18, 19, 30. Idaho, 12, 20, 24. Illinois, 26 to 29. Indiana, 6, 28, 29. Iowa, 27, 28, 30, 31. Kansas, 22, 27, 31. Kentucky, 29. Louisiana, 10, 17, 18. Mississippi, 10, 17, 31. Missouri, 27, 28, 29, 31. Nebraska, 27. Nevada, 25. New Hampshire, New Mexico, 2. New York, 30. North Carolina, 1, 11, 12, 18. Ohio, 26, 28, 29. Oklahoma, 1. Oregon, 29. South Dakota, 27. Tennessee, 1, 29, 30. Texas, 10, 11. Virginia, 29, 30. Washington, 6, 7, 20, 28, 29. West Virginia, 29. Wisconsin, 28, 31.

SLEET.

The following are the dates on which sleet fell in the respective States:

Alabama, 11, 12, 19. Arkansas, 4, 12 to 15, 23. California, 1, 2, 3. Colorado, 20, 22, 25, 28, 31. Connecticut, 2, 11, 16, 19. Delaware, 10, 11, 23. District of Columbia, 11, 23. Georgia, 11, 18, 19. Idaho, 1, 5, 24 to 30. Illinois, 3, 4, 5, 10, 14, 15, 18, 22, 23, 26. Indiana, 1, 6. Indian Territory, 14, 15. Iowa, 4, 5, 11, 27, 31. Kansas, 1 to 4, 6, 13, 14, 17, 21, 22, 23, 31. Kentucky, 3, 5, 11, 14, 19, 23. Louisiana, 12. Maine, 3, 4, 7, 12, 27, 29. Maryland, 1, 11, 16, 19, 23, 24, 26. Massachusetts, 2, 7, 11, 15, 16, 17, 19, 29. Michigan, 5, 6, 25, 28, 29, 31. Minnesota, 5, 18, 27 to 31. Mississippi, 3, 11, 18, 19. Missouri, 2 to 5, 8, 11 to 15, 22, 23, 27. Montana, 11, 13, 30. Nebraska, 1 to 5, 12, 17, 18, 22, 28, 30, 31. Nevada, 1, 2, 4, 8, 16, 26 to 30. New Hampshire, 6, 7, 19, 26, 29, 30. New Jersey, 1, 10 to 13, 15, 16, 23, 24. New Mexico, 4, 5, 17. New York, 1, 2, 7, 10, 11, 12, 16, 19, 29, 30. North Carolina, 3, 11, 23, 24. North Dakota, 25, 28, 29, 30. Ohio, 1, 5, 6, 16, 24, 26. Oklahoma, 2, 3, 14, 15, 18. Oregon, 1, 2, 5, 6, 7, 26 to 30. Pennsylvania, 1, 7, 10, 11, 15, 16, 19, 26. South Carolina, 13, 24. South Dakota, 4, 15, 31. Tennessee, 3, 11, 15, 19, 23, 24. Texas, 2, 3, 4, 6, 15. Utah, 4, 10, 17, 28, 30. Vermont, 7, 19, 29, 30, 31. Virginia, 1, 11, 26. Washington, 6, 27, 29, 30. West Virginia, 1, 6, 10, 15, 23. Wisconsin, 5, 6, 9, 25, 27, 30, 31.

WIND.

The prevailing winds for March, 1896, viz, those that were recorded most frequently, are shown in Table I for the regular Weather Bureau stations.

The resultant winds, as deduced from the personal observations made at 8 a. m. and 8 p. m., are given in Table IX. These latter resultants are also shown graphically on Chart IV, where the small figure attached to each arrow shows the number of hours that this resultant prevailed, on the assumption that each of the morning and evening observations represents one hour's duration of a uniform wind of average velocity. These figures indicate the relative extent to which winds from different directions counterbalanced each other.

The diurnal variation in the velocity of the wind is shown in Table VII, which gives the total movement for each hour of seventy-fifth meridian time, as deduced from self-registering anemometers at about 136 stations.

HIGH WINDS.

Maximum wind velocities of 50 miles or more per hour were reported at regular stations of the Weather Bureau as follows (maximum velocities are averages for five minutes;

extreme velocities are gusts of shorter duration, and are not given in this table):

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
		Miles				Miles	
Amarillo, Tex.	13	50	e.	Hatteras, N. C.	17	54	n.
Do.	17	52	n.	Huron, S. Dak.	27	54	se.
Do.	27	60	w.	Kittyhawk, N. C.	11	58	sw.
Do.	28	56	w.	Do.	19	50	se.
Do.	31	62	n.	Marquette, Mich.	24	52	s.
Baltimore, Md.	19	50	s.	New Haven, Conn.	11	50	ne.
Block Island, R. I.	11	72	ne.	New York, N. Y.	2	70	w.
Boston, Mass.	11	50	no.	Do.	3	60	nw.
Buffalo, N. Y.	7	54	w.	Do.	4	72	nw.
Cheyenne, Wyo.	7	50	w.	Do.	5	53	nw.
Do.	27	52	nw.	Do.	19	66	se.
Chicago, Ill.	21	57	s.	Do.	26	55	nw.
Do.	25	57	sw.	Do.	27	54	nw.
Cleveland, Ohio.	19	52	nw.	Philadelphia, Pa.	3	50	nw.
Denver, Colo.	25	58	nw.	Pueblo, Colo.	17	50	n.
Do.	27	60	sw.	Tatoosh Island, Wash.	1	50	e.
Dodge City, Kan.	27	50	sw.	Do.	2	52	ne.
Eastport, Me.	1	68	e.	Williston, N. Dak.	21	56	nw.
Do.	12	53	sw.	Winnemucca, Nev.	6	50	sw.
Do.	19	55	se.	Woods Hole, Mass.	2	50	nw.
El Paso, Tex.	4	62	sw.	Do.	3	58	nw.
Do.	17	54	nw.	Do.	4	56	nw.
Do.	27	58	w.	Do.	12	50	w.
Fort Canby, Wash.	28	57	s.	Do.	20	55	sw.

SUNSHINE AND CLOUDINESS.

The quantity of sunshine, and therefore of heat, received by the atmosphere as a whole is very nearly constant from year to year, but the proportion received by the surface of the earth depends upon the absorption by the atmosphere, and varies largely with the distribution of cloudiness. The sunshine is now recorded automatically at 17 regular stations of the Weather Bureau by its photographic, and at 21 by its thermal effects. At one station records are kept by both methods. The photographic record sheets show the apparent solar time, but the thermometric sheets show seventy-fifth meridian time; for convenience the results are all given in Table XI for each hour of local mean time.

Photographic and thermometric registers give the duration of that intensity of sunshine which suffices to make a record, and, therefore, they generally fail to record for a short time after sunrise and before sunset, because, even in a cloudless sky, the solar rays are then too feeble to affect the self-registers. If, therefore, such records are to be used for determining the amount of cloudiness, they must be supplemented by special observations of the sky near the sun at these times. The duration of clear sky thus specially determined constitutes the so-called twilight correction (more properly a low-sun correction), and when this has been applied, as has been done in preparing Table XI, there results a complete record of the clearness of the sky from sunrise to sunset in the neighborhood of the sun. The twilight correction is not needed when the self-registers are used for ascertaining the duration of a special intensity of sunshine, but is necessary when the duration of cloudiness is alone desired, as is usually the case.

The average cloudiness of the whole sky is determined by numerous personal observations at all stations during the daytime, and is given in the column "average cloudiness" in Table I; its complement, or percentage of clear sky, is given in the last column of Table XI.

COMPARISON OF DURATIONS AND AREAS.

The sunshine registers give the *durations* of effective sunshine whence the duration relative to possible sunshine is derived; the observer's personal estimates give the percentage of *area* of clear sky. These numbers have no necessary relation to each other, since stationary banks of clouds may obscure the sun without covering the sky, but when all clouds have a steady motion past the sun and are uniformly scattered over

the sky, the percentages of duration and of area agree closely. For the sake of comparison, these percentages have been brought together, side by side, in the following table, from which it appears that, in general, the instrumental records of percentages of durations of sunshine are almost always larger than the observers' personal estimates of percentages of area of clear sky; the average excess for March, 1896, is 10 per cent for photographic and 11 per cent for thermometric records. The details are shown in the following table, in which the stations are arranged according to the greatest possible duration of sunshine, and not according to the *observed* duration as heretofore.

Difference between instrumental and personal observations of sunshine.

Stations.	Apparatus.	Total possible duration.	Personal estimated area of clear sky.	Instrumental record of sunshine.			
				Photographic.	Difference.	Thermometric.	Difference.
		Hrs.	%	%	%	%	%
Galveston, Tex.	P.	372.6	46	50	+ 4		
New Orleans, La.	T.	372.5	45			49	+ 4
Atlanta, Ga.	T.	372.3	42			65	+ 23
Phoenix, Ariz.	P.	372.3	53	75	+ 22		
San Diego, Cal.	P.	372.3	52	68	+ 16		
Wilmington, N. C.	T.	372.2	61			72	+ 11
Little Rock, Ark.	T.	372.1	33			48	+ 15
Savannah, Ga.	P.	372.1	58	69	+ 11		
Vicksburg, Miss.	T.	372.1	51			57	+ 6
Santa Fe, N. Mex.	P.	371.9	55	67	+ 12		
Baltimore, Md.	T.	371.4	49			52	+ 3
Cincinnati, Ohio.	T.	371.4	41			49	+ 8
Dodge City, Kans.	P.	371.4	57	69	+ 12		
Kansas City, Mo.	P.	371.4	47	53	+ 6		
Louisville, Ky.	T.	371.4	39			54	+ 15
St. Louis, Mo.	T.	371.4	48			58	+ 10
San Francisco, Cal.	T.	371.4	46			51	+ 5
Washington, D. C.	P.	371.4	57	57	0		
Columbus, Ohio.	T.	371.2	37			49	+ 12
Denver, Colo.	P.	371.2	43	66	+ 23		
Eureka, Cal.	P.	371.2	44	45	+ 1		
New York, N. Y.	T.	371.2	47			55	+ 8
Philadelphia, Pa.	T.	371.2	49			64	+ 15
Salt Lake City, Utah.	P.	371.2	26	48	+ 22		
Buffalo, N. Y.	T.	370.9	36			53	+ 17
Rochester, N. Y.	T.	370.9	49			58	+ 9
Boston, Mass.	T.	370.8	45			56	+ 11
Chicago, Ill.	T.	370.8	54			65	+ 11
Cleveland, Ohio.	P.	370.8	32	42	+ 10		
Des Moines, Iowa.	T.	370.8	36			51	+ 15
Detroit, Mich.	T.	370.8	50			57	+ 7
Eastport, Me.	P.	370.7	32	46	+ 14		
Northfield, Vt.	P.	370.7	32	40	+ 8		
Portland, Me.	T.	370.7	43			55	+ 12
Bismarck, N. Dak.	P.	370.3	44	50	+ 6		
Helena, Mont.	P.	370.3	50	51	+ 1		
Portland, Oreg.	T.	370.3	44			43	+ 1
	P.	370.3	44	44	0		

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table X, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

The dates on which reports of thunderstorms for the whole country were most numerous were: 27th, 118; 28th, 164; 29th, 152; 31st, 127.

Thunderstorm reports were most numerous in Illinois, 85; Ohio, 89; Tennessee, 69.

Thunderstorms were most frequent in: Texas, 14 days; Illinois and Mississippi, 13.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz, from the 1st to the 3d, and also the 24th to the 31st, inclusive. On the remaining twenty days of this month 362 reports were received, or an average of about 18 per day. The dates on which the number of reports especially exceeded